

**PATHOLOGICAL RESEARCHES**  
**RESPECTING**  
**THE DISEASES OF JOINTS.**

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**COMMUNICATED**

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**A**S the articulations of the human body are composed of various parts, each possessing its own peculiar anatomical structure, we cannot but suppose that they are subject to a variety of diseases. It is also reasonable to conclude that these diseases may differ with respect to their causes and progress; that they may be attended with different degrees of danger to the affected organ, and that for each there may be certain remedies better adapted than others for its relief. Remarks so obvious cannot be regarded as original, yet I am not aware that any one has undertaken to investigate the subject with a view to make a classification of the morbid affections to which the joints are liable, and still less has it been attempted to point out the diagnostic marks by which they may

be distinguished, and the methods of treatment which they respectively require. The terms white swelling, scrophulous joints, carious joints, &c. have been employed almost indiscriminately, and I believe it will be found that the same name has often been applied to different maladies, and that the same malady has been spoken of under different appellations.

Yet no part of chirurgical science appears to be much more worthy of attention. The diseases of joints are of very frequent occurrence : some of them go on towards an unfavourable termination, in spite of whatever remedies are adopted ; others are capable of being materially relieved or completely cured : they are all formidable if neglected. It is very desirable that we should be capable of forming such a distinction of these diseases, as may enable us to determine in what case a cure may, or may not be expected, and in the former, what applications or medicines may be employed in preference, and with the fairest prospect of advantage.

Perhaps nothing has contributed in so great a degree to the modern improvements in surgery, as the practice of examining the changes of anatomical structure which disease produces, particularly in those cases where there has been an opportunity of witnessing the previous progress and symptoms of the complaint. There seems to be no better foundation for a scientific arrangement of diseases, or

for acquiring a knowledge of the characters by which they are to be distinguished; and the having ascertained in what the deviations from the natural actions of the animal body consist, is at any rate an important step towards understanding the method, by which such deviations are to be corrected.

If a joint be examined in the most advanced stage of a disease, all the parts composing it are found blended into a confused mass, in which it is impossible to distinguish the original nature and seat of the morbid action. It is only where an opportunity presents itself of making the dissection at an earlier period, that we are likely to procure that kind of information which is calculated to throw light on this subject. But such opportunities are of comparatively rare occurrence, since the joints are not vital organs, and the affections to which they are liable seldom prove fatal, or even require amputation, until they have made considerable progress; and this circumstance is in itself sufficient to form a very material obstacle to the improvement of this branch of pathology.

It is only by the successive labours of many individuals, that any part of a science so difficult and so obscure as those of medicine and surgery can be brought to a state at all approaching perfection: but this, instead of operating in a contrary manner, should rather form an inducement to each person, who possesses the means of gaining experi-

ence, to lay the results of his experience before the public; to bring them into the common stock, and to contribute, as far as it is in his power, to the general improvement of his profession. The observations, which I have now the honor of presenting to the Society, are, for the most part, drawn from cases which have come under my notice within the last few years, in one of the principal hospitals of this metropolis. They relate to the pathological history, and classification of the diseases of joints. Should this communication be favourably received, I may, on a future occasion, venture to offer some additional remarks on the diagnostic symptoms by which these diseases may be distinguished, and the different methods of treatment which they require for their relief.

## II.—*On the Inflammation of the Synovial Membrane.*

The soft parts which, added to the bones and cartilages, constitute the structure of the joints, are the synovial membrane, by which the lubricating fluid is secreted; the ligaments, by which the bones are connected to each other; and the fatty substance, which occupies what in certain positions would otherwise be empty spaces. It is to be supposed that the adipose membrane belonging to the joints may be inflamed; that it may be the seat of abscesses and tumors, as well as that which is situated beneath the skin, or in the inter-

stices of the muscles ; and the ligaments cannot be regarded as more exempt from disease than the fibrous membranes, which they very nearly resemble in their texture. The ligaments and the fat of joints are sometimes inflamed in consequence of mechanical injury ; and I cannot say that I have never seen a case where disease, independently of this cause, has originated in them ; but I certainly have met with no instance where it has been proved to have done so by dissection, and it may be safely asserted, that this is a rare occurrence, and not what happens in the ordinary affections to which the joints are liable.

On the other hand, no part of the body is much more frequently diseased than the synovial membranes. This is what their anatomical structure and their functions might lead us to expect, since we generally find that living organs are more subject to have their natural actions deranged, in proportion as they are more vascular, and as they are employed in a greater degree in the process of secretion.

For a more particular account of the synovial membrane, I may refer to the authors who are quoted below\*. At present it is sufficient to

\* Bichat, *Traité des Membranes*. See also Dr. William Hanker's Paper on the Structure of Cartilage, in the 42d vol. of the *Phil. Transactions*.

observe that its office is to secrete the synovia, by which the motion of the joints is facilitated; that it lines the ligaments, by which the bones are held together; covers the bones themselves for a small extent, and thence passes over the cartilaginous surfaces and the interarticular fat. Where it adheres to the bones and soft parts, it very much resembles the peritonæum in its structure, and possesses considerable vascularity; but where it is reflected over the cartilages it is thin and readily torn, and contains no vessels capable of carrying red blood:—its existence however, even here, may be always distinctly demonstrated by a careful dissection. The synovial membrane of a joint forms a bag having no external opening; in this respect resembling the peritonæum, the pleura, or the pericardium, which it also resembles in its functions, and to which it bears some analogy in its diseases.

Cases occasionally occur, in which a joint is swollen from a preternatural quantity of fluid collected in its cavity, without pain or inflammation. This may be supposed to arise either from a diminished action of the absorbents, or an increased action of the secreting vessels. The disease may be compared to the dropsy of the peritonæum, or pleura, and it has not improperly been designated by the terms *hydrops articuli*.

It more frequently happens that there is swell-

ing from fluid in the joint, with inflammation and pain. Here we may presume that the disease consists in an inflammation of the synovial membrane, with a consequent increase of the secretion from its surface; and this is confirmed by the appearances observed in those cases, in which an opportunity occurs of examining the affected parts after death.

In many instances, while there is still pain and inflammation in the joint, the fluid in its cavity is felt indistinctly, as if a considerable mass of soft substance lay over it. Often, when the inflammation has subsided, and the fluid is no longer to be felt, the joint remains swollen and stiff, painful when bent or extended beyond a certain point, and liable to a return of inflammation from slight causes. The appearances observed in the following cases, in which there was an opportunity of examining the effects which the disease had produced, seem to throw light on this subject.

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### *CASE I.*

A middle-aged man was admitted into St. George's Hospital, in September, 1810, on account of a disease in one knee. The joint was swollen and painful, with slight stiffness; fluid was felt in its cavity. The swelling extended some way up the anterior part of the thigh, behind the lower

portion of the extensor muscles. It subsided under the use of blisters and liniments. Two months after his admission into the hospital, he was seized with a fever, apparently unconnected with the disease in the knee, of which he died.

On examining the affected joint, the synovial membrane was found much dilated, so that it extended up the anterior surface of the femur, behind the extensor muscles at least an inch and a half higher than usual. Throughout the whole of its internal surface, except where it covered the cartilages, the membrane was of a dark colour from inflammation ; the vessels being as numerous, and as much distended with blood, as those of the tunica conjunctiva of the eye in a violent ophthalmia. At the upper and anterior part of the joint, a thin flake of coagulable lymph was effused from the inner surface of the synovial membrane, of the size of a half-crown-piece. There was no other appearance of disease, except that at the edge of one of the condyles of the femur, the cartilage adhered to the bone less firmly than usual.

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### *CASE II.*

A. B. a young man, in the spring of the year 1808, in consequence (as he supposed) of exposure to damp and cold, became affected with a pain-



ful swelling of one of his knees. Under the treatment employed by the practitioner whom he consulted, the pain and swelling, in good measure, but not entirely, subsided. Three months after the disease first took place, he was admitted into St. George's Hospital. At this time the knee was swollen, painful, and tender. The swelling had the form of the articulating ends of the bones. The leg was confined nearly to the straight position, and admitted of very little motion on the thigh. His general health was unaffected.

Blood was taken from the knee by cupping, and afterwards it was rubbed daily with mercurial ointment and camphor. Under this treatment the pain and inflammation subsided, and the swelling and stiffness were in some measure lessened. It afterwards became necessary to amputate the limb on account of another disease. The operation was performed on the 15th of December, 1808, and I did not neglect the opportunity of examining the joint.

The bones, cartilages, and ligaments were in a natural state. The synovial membrane was about  $\frac{1}{8}$  of an inch in thickness, and of a gristly texture. It was closely attached to the surrounding cellular membrane and fascia by means of coagulable lymph, which had been formerly effused on its external surface.

These cases seem to explain the usual consequences of inflammation of the synovial membrane. It occasions, 1. a preternatural secretion of synovia; 2. effusion of coagulable lymph into the cavity of the joint; 3. in other cases, a thickening of the membrane, a conversion of it into a substance resembling gristle, and an effusion of coagulable lymph, and probably of serum into the cellular structure, by which it is connected to the external parts.

I have seen several cases, where, from the appearance of the joint, and the symptoms, there was every reason to believe that the inflammation had produced adhesions, more or less extensive, of the reflected folds of the membrane to each other; and I have observed, occasionally, adhesions in dissection which may reasonably be supposed to have arisen from inflammation at some former period.

These effects of inflammation of the synovial, very much resemble those of inflammation of the serous membranes. There are, however, some points of difference. In the former I have reason to believe, that suppuration rarely takes place independently of ulceration; but this is a frequent occurrence in the latter. Inflammation of the peritonæum, or pleura, though very slight in degree and of very short duration, terminates in the effusion of coagulable lymph; but it is only violent,

or long continued inflammation which has this termination in the membranes of joints.

The slight adhesion of the cartilage to the bone in one of the cases which have been related, we must suppose to have proceeded from the greater disease in the synovial membrane. I shall have occasion hereafter to remark, that the same thing may be observed where the cartilage is about to ulcerate. I have known a few cases, in which there was extensive destruction of the cartilages of a joint, and which, from the previous history and symptoms, there could be no doubt was occasioned by neglected inflammation of the synovial membrane. I believe, however, that this does not frequently occur, and that in most cases where the two diseases are combined, the ulceration of the cartilage is the primary affection, and the inflammation of the synovial membrane takes place subsequently in consequence of the formation of an abscess in the cavity of the joint.

The inflammation of the synovial membrane is sometimes acute, but more frequently it assumes the chronic form, and then it is very often confounded with other more serious maladies under the general appellation of white swelling. Perhaps nearly one half of the cases to which this term is applied are of this description. The disease takes place from various causes, but in most

instances from the application of cold, which explains why it is more liable to occur in the superficial joints, such as the knee and ankle, than in the hip and shoulder, which are defended by a thick mass of soft substance from the influence of the external temperature. The disease may also arise from the use of mercury exhibited in too large quantities, or in particular constitutions; from rheumatism, and a generally debilitated state of the system. In these cases the inflammation is to be considered as a symptom of a constitutional complaint; often affecting several joints at the same time; leaving one joint to attack another, and it is for the most part less severe, and less disposed to terminate in the effusion of coagulable lymph and thickening of the membrane, than where it is entirely a local disease.

### III.—*On Ulceration of the Synovial Membrane.*

When an abscess has formed in a joint, an ulcerated opening takes place in the synovial membrane, through which the matter is discharged. The following are the only cases, which have come under my observation, where ulceration of the synovial membrane has occurred as a primary affection. The most remarkable circumstance, which they demonstrate, is, that a disease, apparently slight, and of a part which is in no way concerned in the vital functions, should produce such a degree of

disturbance of the constitution as to occasion death. Of this however, they form by no means a solitary example, and every surgeon and physiologist will be able to call to mind numerous other instances which shew that an impression upon a small part of the nervous system may derange, and ultimately destroy the functions of the whole animal machine.

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### *CASE III.*

A young lady nine years of age, being at play, on the 1st of January 1808, fell and wrenched her hip. She experienced so little uneasiness that she walked out, on that day, as usual. In the evening she went to a dance; but while there, was seized with a rigor, was carried home, and put to bed. Next morning she was much indisposed, and complained of pain in the thigh and knee. On the following day she had pain in the hip, and was very feverish. These symptoms continued; she became delirious, and she died just a week from the time of the accident.

On inspecting the body, on the following day, the viscera of the thorax and abdomen were found in a perfectly healthy state. The hip joint, on the side of the injury, contained about half an ounce of dark-coloured pus; and the synovial membrane, where it was reflected

over the neck of the femur, was destroyed by ulceration for about the extent of a shilling.

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#### CASE IV.

A middle-aged man who had, a short time before, met with a contusion of the shoulder, was admitted into St. George's Hospital in the winter of 1812. He complained of pain and tenderness in the shoulder, and a very slight degree of swelling was observable, but his principal disease was a fever resembling typhus in its character, of which he died in a few days after his admission.

On inspecting the body, about half an ounce of thin pus was found in the shoulder-joint. The synovial membrane bore marks of general inflammation, and in one spot, where it was reflected over the neck of the os brachii, it was destroyed by ulceration for about the extent of a sixpence.

IV.—*On cases in which the synovial membrane has undergone a morbid change of structure.*

There are some diseases which consist simply in a morbid action; there are others in which the morbid action produces a morbid change of anatomical structure. Diseases, of the latter class,

differ in their nature in different organs. Thus the tubercles which affect the lungs in phthisis pulmonalis are never met with in the breast; and cancer, which is frequent in the breast, never attacks the lungs except by extending to them from the contiguous parts. The disease, which I am about to describe in the present section, consists in a morbid alteration of structure which takes place in the synovial membranes of joints, and which, as far as I have seen, is peculiar to these parts. I have never known an instance of the same disease in the serous membranes, which so nearly resemble the former in their nature and functions, nor even in the synovial membranes that constitute the bursæ mucosæ and sheaths of the tendons.

Some years since, in examining a diseased elbow, I found the cartilaginous surfaces completely destroyed by ulceration: an abscess had formed in the joint, and no remains were observable of the natural structure of the soft parts, these being everywhere converted into a pulpy substance, of a light brown colour, and about  $\frac{1}{3}$  of an inch in thickness. As the ravages of the disease were very extensive, it was impossible to determine from the appearances on dissection, where the morbid action had originated. This case, however, differed materially from some others which I had met with, in which the destruction of the cartilages was not attended by any affection of the soft parts similar to that which has been described. The following

cases, which have since occurred, furnish examples of the same disease in earlier stages of its progress, and shew that it begins in the synovial membrane, and that the other parts become affected only in a secondary manner.

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### *CASE V.*

In a diseased knee, which was sent to me for examination by my friend Mr. Horn, Surgeon to the Newcastle Infirmary, I found, in the cavity of the joint, about four ounces of a pale yellow fluid, having flakes of coagulable lymph floating in it. The synovial membrane, where it formed the loose folds, extending from one bone to the other; where it was reflected over the bones themselves, the crucial ligaments, and the fatty substance of the joint, had completely lost its natural appearance. It was converted into a pulpy substance, in most parts about  $\frac{1}{4}$ , but in some parts, nearly  $\frac{1}{2}$  of an inch in thickness, of a light brown colour, intersected by white membranous lines, and with red spots formed by small vessels injected with their own blood. The synovial membrane on the edge of the cartilaginous surfaces had undergone a similar change of structure, but only for a small extent. The semi-lunar cartilages were entire, but in a great measure concealed by the pulpy substance projecting over them. The cartilages



covering the bones, in a few places, were in a state of incipient ulceration.

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*CASE VI.\**

Martha Manners, 26 years of age, was admitted into St. George's Hospital on the 6th of March, 1813, on account of a disease in her right knee.

She said that in June, 1811, she first observed the joint to be swollen and stiff; and from this time the swelling and stiffness increased; but in the first instance by very slow degrees. About Michaelmas, 1812, she caught cold, and the swelling increased more rapidly, but it was not attended with any considerable quantity of pain.

At the time of her admission into the hospital, the right knee measured about two inches in circumference more than the left. The swelling was elastic; prominent at the upper and lower part of the joint, not having the form of the articulating ends of the bones. The joint admitted of motion, but the leg could not be completely bent or extended on the thigh.

\* This case has been inserted since the paper was read in the place of another of the same kind; but with the history and symptoms of which I was unacquainted.

Various remedies were employed without the smallest benefit. The stiffness of the joint increased. About the middle of May, she began to experience considerable pain, and soon afterwards an abscess presented itself by the side of the ligament of the patella, which was opened on the 15th of June. The orifice made by the lancet healed in a few days; but she continued to suffer severe pain; her health became much affected, and on the 6th of August the limb was removed by amputation.

On examining the joint, about an ounce of thick matter was found in its cavity. The ligaments were in a natural state. The synovial membrane had undergone precisely the same alteration as in the case which has been just related. The only point of difference that could be observed, was, that the *whole* of that portion of the membrane, which is reflected over the cartilages, had become affected, presenting the same appearance as elsewhere, but being thickened in a less degree. The cartilages had begun to ulcerate in a few spots; but the ulceration had made so little progress that it might not have been noticed on a superficial inspection.

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### CASE VII.

Samuel Langford, 24 years of age, was admitted into St. George's Hospital on the 22nd of April, 1812.

At the time of his admission one of his knees was swollen to nearly twice its natural size. The swelling was prominent on the anterior and lower part of the thigh. It was soft and elastic, so that at first it appeared to contain fluid, but on particular examination, the absence of fluid was ascertained, by the want of fluctuation. The leg was kept in the half bent state, and the joint admitted of only a very limited degree of motion. He had no pain even when attempts were made to move the limb. The skin, over the diseased part, was of a pale colour, with some dilated veins ramifying in it. On each side of the joint, a small orifice was observed, through which the probe might be introduced into a sinus; but the sinuses appeared to be of small extent. His general health was unimpaired.

He said, that two years ago he first experienced some pain in the knee, but it was not sufficient to prevent his going about his usual occupations. Soon afterwards the joint began to swell, and the enlargement gradually increased from that period. Several abscesses had formed at different times, but the greater number of them had healed.

About two months after his admission into the hospital, the limb was amputated.

On dissecting the diseased joint, the ligaments were found in a perfectly natural state. The

whole synovial membrane, except where it was reflected over the cartilages, was converted into a pulpy, elastic substance, of a brown colour, intersected by white membranous lines, in some places half an inch in thickness, in others more; and in those parts where the membrane was reflected over the bones, near the borders of the cartilages, it was destroyed, in spots, by ulceration.

The semi-lunar cartilages were in a natural state, but in a great measure concealed in consequence of their being enveloped in the mass of substance formed by the diseased synovial membrane.

The cartilaginous surfaces of the femur and patella were extensively, but not entirely, destroyed by ulceration; the ulceration being greatest towards the circumference. On the internal portion of the head of the tibia the cartilage was destroyed only for a very small extent, the ulceration being entirely confined to the margin. On the external portion of the head of the tibia the cartilage was absorbed to a greater extent. The bones possessed their natural structure and hardness. The cavity of the joint contained matter, and the sinuses communicated with it.

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#### *CASE VIII.*

Michael Purcel, 16 years of age, was admitted

into St. George's Hospital on the 10th of July, 1811, on account of a disease in the right knee.

He said, that in the summer of 1807, he had received a blow on the inside of the joint. Some time afterwards a swelling formed and burst, and some fluid was discharged. In about a week the orifice healed; a slight degree of stiffness only remained, and he was able to follow his usual occupations. He continued well till December 1810, when the joint was observed to be increased in size. From this time the swelling increased, but with no other inconvenience than stiffness of the joint, and a slight degree of pain in walking.

At the time of his admission into the hospital, there was a large swelling of the knee, extending an inch or more up the anterior part of the thigh, under the extensor muscles. The swelling was more prominent in some parts, than in others: it was soft and elastic, and gave to the hand an indistinct sensation, as if it contained fluid. The leg was kept in the half-bent position, and was nearly immoveable on the thigh. He had no pain except on motion or pressure.

On the 28th of November, an abscess burst on the outside of the joint, and discharged a small quantity of pus. After this, other abscesses formed, and burst at various times. The swelling continued to increase.

Amputation was performed on the 6th of April.

On dissecting the amputated joint, all the ligaments were found in a natural state. The synovial membrane had precisely the same appearance as in the last case. In some parts it was half an inch, in other parts more than an inch, in thickness. The cartilages were for the most part destroyed by ulceration, and \* carious surfaces of bone were exposed. The abscesses appeared to have formed in the substance of the synovial membrane, and did not communicate with the cavity of the joint, nor did the joint contain pus.

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### CASE IX.

A boy, 6 years of age, was admitted into St. George's Hospital, in March, 1808, on account of a disease in one knee.

The joint was larger than the natural size. The leg was bent at a right angle to the thigh, and admitted of no motion. The skin on the outside was ulcerated to a considerable extent. Various

\* In using the term caries, on this and on other occasions, I have considered it as synonymous with ulceration; or, at least, as expressing that state in bones, which corresponds to ulceration in soft parts. Some confusion has been produced in Pathological Nomenclature, in consequence of this term having been employed by some, to express, not only bone, which is ulcerated, but that whose surface is exposed from other causes.

remedies having been employed without success, the limb was amputated on the 29th of April.

On examining the joint, the synovial membrane was found to have undergone a morbid change of structure, similar to that in the preceding cases, but with this difference; that the pulpy substance into which it was converted, projected into the joint, so as nearly to fill its cavity, and adhered to the cartilaginous surfaces. On making a longitudinal section of the joint, the cartilage covering the bones was seen, as a white line about  $\frac{1}{10}$  of an inch in thickness, connected to the bone on one side, and having the pulpy substance adhering to it on the other. It was, therefore, thinner than natural; but otherwise entire, except at the posterior part of one of the condyles of the femur, where it was destroyed by ulceration for a small extent. There were no distinct remains of the ligaments external to the joint, and only some small remains of the crucial ligaments and semilunar cartilages.

The preceding cases furnish examples of the same disease, in different stages of its progress. The morbid action evidently originates in the synovial membrane, which loses its natural organization, and becomes converted into a thick, pulpy substance, of a light brown colour, intersected by white membranous lines. As the disease advances, it involves all the parts of which the joint is com-

posed, producing ulceration of the cartilages, caries of the bones, wasting of the ligaments, and abscesses in different places.

I have already remarked, that this disease is peculiar to the synovial membranes, at least that I have never met with it in any other part of the body ; but it belongs to the same order with the tubercles of the lungs, the schirrus of the breast, the medullary sarcoma of the testicle, and numerous others, in which the natural structure of the affected organ is destroyed, and a new and different structure is added in its place. To these also it bears a near resemblance in its progress. Thus tubercles of the lungs, in the first instance, occupy the vesicular and interlobular substance ; but, ultimately, they inflame and ulcerate ; abscesses form in them, and then the pleura, the bronchia, and the other contiguous parts become affected. Similar circumstances mark the progress of other maladies of the same description.

In many other cases, in which, however, I had no opportunity of examining the morbid appearances, the similarity of the history and symptoms, and the resemblance in the form and elasticity of the tumor, has indicated the disease to have been of the same nature as in those which have been related. The complaint uniformly has proved slow in its progress, and sometimes has remained



nearly in an indolent state for many months, or even for one or two years ; but I have never met with an instance, in which a real amendment was produced ; much less have I known any, in which a cure was effected. Indeed there seems to be no analogy that should lead us to expect so favourable a termination, as I am not aware, that a part that has once completely lost its natural structure, is capable, in any instance, of having that structure restored. The progress of this disease in a joint may be retarded by rest, by the occasional application of leeches, and the removal of those causes which are calculated to excite inflammation ; but I have never known more than this to be done either by internal medicines or local remedies. When the cartilages are in a state of ulceration, and abscesses have formed in and about the joint, and the patient's health begins to suffer, it is needless to recommend any other treatment than the removal of the limb by amputation, and to delay this for any considerable time can be attended with no benefit, and may produce much evil to the patient.

It is a remarkable circumstance that this affection of the synovial membrane is rarely met with, except in the knee. I have never known an instance of it in the hip or shoulder. It is probable that the influence of the external cold may operate as one of the causes, by which the disease is

produced, and this explains why it occurs frequently in the knee, and seldom in the deep seated articulations \*.

It is evident from the history of cases in which a part of the living body assumes a new and morbid structure, that this alteration seldom takes place except by slow degrees: and it would add much to the interest and utility of researches in morbid anatomy, if it were more frequently attempted to ascertain what is the first change in the organization of the affected part which disease produces, and from thence to trace the gradual progress of the changes which take place, until the destruction of the natural organization is completed. Whether the following case is to be considered as of the same kind with those already recorded in this section, but in an earlier stage of the disease, cannot at present be determined; but it appears not improbable that it is so; and I shall venture to relate it in this place, in the expectation that it may, at any rate, be of some service in assisting the investigations of future enquirers.

\* The account of the fungus articuli which has been given by some German writers, appears to have been drawn, partly from cases of the disease described in this section, partly from cases of inflammation of the synovial membrane. Mr. Russel seems to have taken his history of the pathology of white swelling from cases similar to those which have been related; but we must observe that the term, white swelling, has been applied, almost indiscriminately, to all the affections, to which the joints are liable, and by no means confined to that under our present consideration.

*CASE X.*

—— Belton, a boy 11 years of age, was admitted into St. George's Hospital in August, 1810, on account of a disease in one knee.

There was but little pain in the joint ; it was slightly enlarged, admitted of some motion, but not of complete flexion and extension. His parents said that the disease had begun about a year and a half before his admission into the Hospital, that it had increased very slowly, and that he had never suffered from it any serious distress. Various remedies were employed without benefit, and in a short time his friends took him out of the hospital. A few weeks afterwards he died, in consequence of an accumulation of water in the ventricles of the brain.

I obtained permission to examine the body.

The synovial membrane of the affected knee, externally had its natural appearance. Internally it was lined by a straw-coloured gelatinous substance, so intimately adhering to it, that it could not be detached, except by an artificial separation. The synovial membrane was encrusted in this manner every where except on the cartilaginous surfaces. The gelatinous substance in general appeared about  $\frac{1}{2}$  of an inch in thickness, but in

some parts near the borders of the cartilage, it was much thicker so as to project considerably into the cavity of the joint. In a few places towards the margin of the articulating surfaces, the cartilage had begun to ulcerate ; in some of these it was entirely absorbed, so that the bone was exposed, but for the most part there was only an irregular ulcerated surface towards the cavity of the joint, the remaining portion of the cartilage being entire, and having its natural adhesion to the bone.

The synovial membrane itself bore no marks of inflammation. In the substance with which it was lined, some vessels were observed ramifying, beautifully injected with their own blood ; but these were few in number and only in certain parts. This substance differed in appearance from the coagulable lymph, which is found on the surface of an inflamed membrane, and we may presume, therefore, that the effusion of it was the result, not of inflammation, but of some other morbid action.

§ 5. *On the Ulceration of the Cartilages of Joints.*

The cartilages of joints differ in some essential circumstances from those which are employed in other organs. The latter are more vascular, more liable to become inflamed ; and inflammation in them usually terminates in the deposition of osseous matter. The articular cartilages in the adult

possess no vessels capable of carrying red blood. Inflammation is not in them a frequent occurrence; when it does take place, it terminates in ulceration, and not in the formation of bone.

Ulceration of cartilage may be the consequence of inflammation of the cartilage itself, or of the bony surface to which it is connected; but in many instances there are no evident marks of inflammatory action having preceded it, either in one part or the other, and the inflammation which afterwards takes place appears to be rather the attendant on, than the cause of, the ulcerative process.

The ulceration of soft parts is usually, and as far as I know, always attended with the secretion of pus; but it is otherwise with the articular cartilages, in which suppuration seldom takes place, while the ulcer is small, and often the disease proceeds so far, as to cause caries of the bones to a considerable extent without matter being formed in the joint. This circumstance is deserving of notice. It has been long established that suppuration may take place without ulceration; and it appears, that in this instance, ulceration may take place without the formation of pus.

In the cases, which have been related, the ulceration of the cartilages of the diseased joints was a secondary affection, the consequence of a morbid action originating in the neighbouring soft

parts. There are other cases, and those not of rare occurrence, in which the ulceration of the articular cartilages exists as a primary disease.

When the ulceration of the cartilage occurs in the superficial joints, it constitutes one of the diseases, which have been known by the name of white swelling. From cases, which I have met with, I am led to conclude, that when it takes place in the hip, it is this disease, which has been variously designated by writers, the "*Morbus Coxarius*," the "Disease of the Hip," the "Scrophulous Hip," the "Scrophulous Caries of the Hip-joint." At least it is to this disease that these names have been principally applied, though probably, other morbid affections have been occasionally confounded with it.

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### CASE XI.

In examining a body, brought into the dissecting room in Windmill Street, I found the cartilage in a diseased state in the joints of both hips, of one of the knees, and of both elbows. In some spots, the cartilages of these joints were altogether destroyed by ulceration, and carious surfaces of bone were exposed; in others the cartilage was not completely absorbed, but it had the appear-

ance of fibres, which were connected at one extremity to the bone, while the other extremity was loose towards the cavity of the joint, and having no lateral connection with each other. The intervertebral cartilages connecting the bodies of some of the dorsal vertebræ were also in a diseased state. They retained the usual appearance of concentric layers towards the circumference, but in the centre, instead of the white semi-fluid substance, which is met with under ordinary circumstances, they were found to be of a brown colour, of a solid and somewhat brittle texture, composed of several portions having a very slight adhesion to each other. The ligaments, the synovial membranes, and the bones, were all in a natural state, except that the latter were occasionally carious in consequence of the absorption of the cartilage; but the caries was unattended by the formation of matter.

In this case the original disease appears to have been a morbid state and subsequent ulceration of the cartilages. It shews that where the disposition to it exists, the destruction of the cartilage may take place in several joints at the same time, and I have observed the same thing in many other instances.

The conversion of the cartilage into a soft fibrous structure, I am disposed to believe, is the frequent, though not the constant, forerunner of

ulceration. In a woman, who died a week after a severe contusion of the hip, the cartilage of the head of the femur was found in some parts entirely absorbed, in others having a fibrous appearance similar to what has been described, and I have noticed the same circumstance in other cases, sometimes connected with, and sometimes independent of, local injury.

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### *CASE XII.*

In another body, which had been brought into the dissecting room, the nates on one side were wasted, and flattened in their form, having the appearance which they assume in the ordinary cases of disease in the hip-joint: and this was very distinct, so that it was observed by the students, as well as by myself, and it led me to examine the hip-joint on that side.

The capsular and round ligaments, the synovial membranes, the fatty substance of the joint, and the bones, were all in a perfectly natural state. The cartilage covering the head of the femur for the extent of a sixpence on one side of the round ligament was partially absorbed, and what remained of it converted into a fibrous structure, similar to what was observed in the last case.



This dissection might lead to the suspicion that the first stage of the ordinary disease of the hip-joint, consists in an absorption of the cartilage from one, or both of the bones composing it; at the same time, no positive conclusion can be drawn from it, since the same appearance of the nates is produced occasionally from other causes, and I had no opportunity of learning what other symptoms had existed previous to death.

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### *CASE XIII.*

A boy ten years of age was admitted into St. George's Hospital in April, 1809, on account of a disease of the left hip. The nates were wasted, and flattened; there was pain in the hip and knee, and a large abscess had formed which produced a tumor on the outside of the thigh. An issue was made with caustic behind the great trochanter. About a month after his admission, the skin over the abscess having become inflamed, I made an opening in it with a lancet, and half a pint of pus was evacuated. The orifice, made by the lancet, healed by the first intention, but in a few days, pus was again collected in the abscess, and the tumor was larger and more tense than ever. The limb became shortened; the abscess burst externally; the boy became affected with hectic symptoms, and died on the 21st of October.

On examining the body, the abscess was found communicating with the cavity of the left hip. The capsular ligament, and synovial membrane were not distinguishable from the other soft parts, forming the parietes of the abscess. There was no vestige of the round ligament, and no remains of cartilage on either of the bones composing the joint. The head of the femur was reduced by caries to about one half of its natural size, and from the same cause, the acetabulum was rendered deeper and wider than is natural. At the posterior part, the margin of the acetabulum was more extensively absorbed, and the head of the femur had been drawn out of its cavity, and was lodged on the dorsum of the ilium.

No other disease had been suspected to exist during life. If the boy had ever complained of pain in the right hip, the circumstance had been overlooked on account of the greater disease in that of the opposite side. Having accidentally cut into the joint of the right hip, I found the cartilage, covering the head of the femur, absorbed for about  $\frac{1}{3}$  of its extent, and the surface of bone which was in consequence exposed, was covered by a thin layer of coagulable lymph. The cartilage lining the acetabulum, and all the soft parts belonging to the joint, were in a perfectly natural state, and the bones were of the ordinary texture and hardness.

*CASE XIV.*

A girl, seven years of age, was admitted into St. George's Hospital in May, 1809, on account of a complaint in the left hip. She had pain in the knee, the limb was shorter than is natural, and the nates were wasted and flattened. An issue was made with caustic behind the great trochanter. Soon after her admission an abscess burst near the crista of the ilium. The disease in the hip appeared to be considerably relieved, but on the first of August she died of an accidental attack of erysipelas.

On inspecting the body, the glutæi muscles of the left side were found wasted, and of a dark colour. A sinus extended from the external orifice of the abscess through the soft parts, and communicated with the hip-joint by an ulcerated opening in the margin of the acetabulum.

There were no remains of cartilage on the surface of the acetabulum. The exposed bone was in a carious state, and of a dark colour, and the cavity of the acetabulum was rendered deeper and wider than is usual. The greater part of the cartilage was destroyed on the head of the femur, and the small portion of it which remained, was readily separated from the bone. This circumstance is often met with where cartilage is undergoing the process of ulceration.

The capsular ligament was somewhat thicker than under natural circumstances, and more connected with the surrounding parts. There were no remains of the round ligament.

In the anterior part of the joint, a quantity of organized soft substance, resembling that of adhesions, was interposed between the head of the femur and the acetabulum, and behind this was a collection of dark-coloured pus. From these two causes the head of the femur had been separated from the os innominatum, and pushed outwards, and it had afterwards been drawn upwards by the action of the muscles, so that it was lodged on the superior part of the bony margin of the acetabulum. The synovial membrane was of a dark colour, but not otherwise diseased.

On examining the hip of the opposite side, I found the soft parts external to it, the capsular ligament, synovial membrane, and fatty substance of the joint, having no appearance of disease. The cavity of the joint contained about a drachm of dark-coloured pus. The cartilage was absorbed from about  $\frac{1}{3}$  of the surface of the acetabulum, but the exposed bone presented no appearance of caries. In some parts of the head of the femur, the cartilage had a fibrous appearance, similar to what has been already described; in other parts it was entirely absorbed, and a carious surface of bone was exposed; and elsewhere it was in a natural

state. The round ligament was ruptured by a very slight degree of force, which seemed to arise from the cartilage having been destroyed round its insertion into the acetabulum.

The bones in the neighbourhood of the carious surfaces of the left hip were of a darker colour than usual ; but no such appearance was observed in the bones of the other hip, which were in all respects in a healthy state.

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### *CASE XV.*

William Bridges, 21 years of age, was admitted into St. George's Hospital, on the 28th of November, 1810. He gave the following account of his complaint. About the middle of the May preceding he first experienced a pain in the right knee, which was aggravated by walking. At the end of a month, the pain became so severe that he was under the necessity of being confined to his bed. He had slight pain in the hip ; but that in the knee was intense, keeping him awake at night. An abscess formed, which in the September following burst on the inside of the thigh.

At the time of his admission, the nates were wasted and flattened ; the limb on the affected side was an inch and a half longer than the other ;

there was a large abscess in the posterior part of the thigh. He was emaciated, and laboured under a hectic fever. An issue was made with caustic behind the great trochanter of the femur, and afterwards a second issue was made in the same manner on the anterior edge of the tensor vaginæ femoris muscle. Under this treatment he experienced for a time great relief, notwithstanding several abscesses burst in different parts of the thigh. He became free from pain; regained his flesh; the hectic fever abated; and the discharge from the abscesses was much lessened. The limb now appeared to be shorter than the other. He continued to mend, till the middle of February, 1811. At this period, the former bad symptoms began to return. He was affected with a constant diarrhoea, and profuse perspirations, and he died on the 26th of March following.

On inspecting the body, the glutæi muscles were found wasted and shrunk, and in many parts their texture was destroyed by the abscesses, which communicated with the cavity of the joint by two ulcerated openings, one on the anterior, and the other on the posterior part. The abscesses formed several sinuses in the neighbourhood of the joint, and the capsular ligament was in consequence connected to, and in some measure blended with, the other soft parts.

The joint contained purulent matter. The sy-

novial membrane was darker than natural, but otherwise had the ordinary appearance. There were no remains of the round ligament. The cartilages were everywhere absorbed, and the exposed surfaces of bone were in a carious state. The head of the femur was reduced to about  $\frac{2}{3}$  of its original size, and the acetabulum was rendered deeper and wider, nearly in the same proportion. At the bottom of the acetabulum there was an ulcerated opening, just large enough to admit a common probe, communicating with an abscess within the pelvis. The carious surfaces of the bones had the same dark colour and foetid smell as in other cases of caries, but otherwise they did not differ from healthy bones.

I could add to the foregoing an account of the dissection of several other cases, in which the hip was affected with the same disease, but it would be only unnecessarily occupying the time of the Society. It will be sufficient to observe, that,

1. In the most advanced stage of the disease, none of the parts entering into the composition of the joint retain their natural structure. The soft parts are blended into a confused mass. Sometimes the head of the femur is completely destroyed by the caries, and there remains only the neck, or a part of the neck, of the bone. Often the projecting margin of the acetabulum is entirely absorbed, so that, instead of a cavity, there is

only a broad carious surface of the os innominatum. In a few instances, a portion of the carious bone is found dead, and undergoing the process of exfoliation, or having already exfoliated into the cavity of the joint.

2. In whatever period of the disease the examination is made, the cartilages are found in a state of ulceration ; but the morbid affection of the soft parts and bones varies very much, nor are they much altered from their natural state, except in the most advanced stage of the malady.

From these circumstances, from the presumptive evidence afforded by the 6th Case, and from the appearances in the two following, in which, while the disease had made considerable ravages in one hip, it was in an incipient stage, and wholly confined to the cartilages in the other, we may be justified in concluding, that, in the ordinary cases of caries of the hip, the cartilage is the part primarily affected, and the following may be stated to be the progress of the disease.

1. Ulceration takes place in the cartilages : generally in that of the acetabulum first, and in that of the head of the femur afterwards ; sometimes it begins in both at the same time.

2. The ulceration extends to the bones, which become carious ; the head of the femur is dimi-



nished in size, and the acetabulum is rendered deeper and wider.

3. Abscess forms in the joint, which after some time makes its way, by ulceration, through the synovial membrane and capsular ligament, into the thigh or nates, or even through the bottom of the acetabulum into the pelvis. Mr. Astley Cooper has shewn me two specimens, in each of which the abscess had burst into the rectum.

4. In consequence of the abscess, the synovial membrane and capsular ligament become inflamed and thickened. The muscles are altered in structure ; sinuses are formed in various parts, and at last all the soft parts are blended together into one confused mass, resembling the parietes of an ordinary abscess.

In giving this statement, it cannot be intended to assert, that the hip is not liable to other morbid affections ; and, of course, disease having its origin in the bones or soft parts may ultimately occasion destruction of the cartilaginous surfaces in this as well as in other joints ; but still the conclusion remains, that in the ordinary disease of the hip-joint, in that disease which an intelligent surgeon, in a work written expressly on the subject, has denominated “ the scrophulous caries of the hip,” the ulceration of the cartilages is the primary affection, and the other parts, in and near the joint, become affected only in a secondary manner.

The appearances observed on dissection explain some of the symptoms by which the existence of this disease is indicated.

1. The glutæi muscles, from want of use, gradually become wasted and flabby. The nates, in consequence, are less prominent than is natural, and this gives them the appearance of being increased in breadth, when, on measurement, no such increase is found to exist\*. In some instances even, the nates, on a superficial examination, appear to the eye to be wider than natural, when they are in fact narrower, in consequence of the bones composing the hip having been in part destroyed by ulceration. There are, however, a few cases, where, from the acetabulum being filled with coagulable lymph and matter, the head of the femur is pushed out of its proper situation, and the increased breadth of the nates is not only apparent but real.

2. When the disease is in its most advanced stage, the head of the femur is sometimes com-

\* This alteration in the form of the nates is a symptom, but is not to be considered as a diagnostic mark of disease in the hip-joint, since it may be observed in other cases, where from any cause the glutæi muscles have been for a considerable time in a state of inaction. Thus children are subject to a paralytic state of the muscles of the lower limbs, and in this complaint, if the muscles are affected as high as the pelvis, the nates present to the eye precisely that appearance, which is described above. The difference of the other symptoms enables us to distinguish the two diseases.

pletely destroyed, and the muscles pull the great trochanter upwards towards the crista of the ilium. This may be compared to the fracture of the neck of the femur, and the appearance of the limb is the same as after this injury. The toes are generally turned outwards, and the limb is shortened. It sometimes happens that the limb is shortened, the thigh bent forwards, the toes turned inwards, and there is every symptom existing of a dislocation of the hip, upwards and outwards. The following case fully explains the cause of these appearances.

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### *CASE XVI.*

—— Taylor, a middle-aged man, was admitted into St. George's Hospital, in the autumn of 1805, on account of a disease in his left hip. He laboured also under other complaints, and he died in the February following.

On inspecting the body, the soft parts in the neighbourhood of the joint were found slightly inflamed, and coagulable lymph had been effused into the cellular membrane round the capsular ligament.

There were no remains of the round ligament.

The cartilages had been destroyed by ulceration, except in a few spots.

The bones on the exposed surfaces were carious ; but they retained their natural form and size. The acetabulum was almost completely filled with pus and coagulable lymph : the latter adhering to the carious bone, and having become highly vascular. The head of the femur was lodged on the dorsum of the ilium. The capsular ligament and synovial membrane were much dilated, and at the superior part, their attachment to the bone was thrust upwards, so that although the head of the femur was no longer in the acetabulum, it was still within the cavity of the joint.

Since the man did not attribute this disease to any local injury, we may conclude that the ulceration of the cartilage was the primary affection, and that the dislocation had been produced, in consequence of the head of the femur having been first pushed outwards by the coagulable lymph and pus, which occupied the cavity of the joint, and then drawn upwards by the action of the muscles inserted into the great trochanter.

As, from the peculiar situation and connexions of the hip, affections of this part are attended with particularly serious consequences, I trust that the foregoing descriptions will not be considered as given too much in detail, especially as it will prevent the necessity of entering with much minuteness into the history of the ulceration of the cartilages of other joints, in which the progress of the dis-

ease, allowance being made for the difference of structure and situation, is the same as in the hip.

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### *CASE XVII.*

David Martin, 26 years of age, was admitted into St. George's Hospital on the 25th of July, 1810, on account of a disease in his right knee. He attributed it to a blow which he had received some years previous; but he said, that the symptoms had all been much aggravated within the last six months. At the time of his admission into the hospital, the knee had the appearance of being swollen; but on examination, this was found to arise from the wasting of the muscles, rather than from actual enlargement. The leg was fixed, or nearly so, in the half bent position. The condyles of the femur projected beyond the head of the tibia. He complained of pain, which was particularly severe at night.

An issue was made with caustic on each side of the patella; but the symptoms were not relieved, and an abscess burst on the outside of the joint, discharging a large quantity of matter.

Soon after his admission, he experienced, for the first time, severe pain in the other knee; but

this was unattended by swelling, or any alteration in the form of the joint, and the leg admitted of complete extension and flexion on the thigh. The pain continued, but no swelling ever took place.

In the beginning of September, he was seized with an accidental attack of erysipelas. Abscesses formed in different parts of the leg and thigh; and he gradually sunk, and died on the 7th of November.

On inspecting the body, the right leg was found bent so as to form a right angle with the thigh. The head of the tibia had been drawn towards the ham by the action of the flexor muscles, so that the condyles of the femur were unusually protuberant. The lateral ligaments were in a natural state. There were no remains of the crucial ligaments, or semilunar cartilages. The cartilages of the tibia, femur, and patella had been entirely absorbed. The bones were carious on their exposed surfaces, but not otherwise diseased. The synovial membrane was free from all morbid appearances except at the points of its attachment to the bones, where, in a few places, coagulable lymph had been effused on its surface.

The left knee, externally, had its natural appearance with respect both to form and size. The leg admitted of complete flexion and extension.

On dissection, the ligaments and synovial membrane were found in a perfectly healthy state ; but about  $\frac{1}{3}$  of the cartilaginous surfaces of the tibia and femur were destroyed by ulceration, the ulceration having taken place principally, but not entirely, near the circumference. The cartilage of the patella and semilunar cartilages were entire, but the latter, in some parts, were softer than usual. The bones were free from disease. There was no pus or other fluid in the joint.

The dissection of this case, in which the ulceration of the cartilaginous surfaces was evidently the primary disease, explains well the nature of, at least, many cases of that species of white-swell-ing, which some authors have described, in which there is long continued and severe pain in the joint, before any tumor is observable.

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### *CASE XVIII.*

William Bowles, 18 years of age, was admitted into St. George's Hospital on the 1st of December, 1810. He said, that about eleven months previous to his admission, he was seized with pain in his right knee, which was so severe as to keep him frequently awake at night. Six weeks after the pain attacked him, the joint, for the first time, became swollen. He now applied to a practitioner,

under whose treatment, joined with perfect rest, the pain and swelling subsided, so that he was able to walk about. In the September following, having returned to his usual occupations, and used the joint a good deal, the pain and swelling returned.

At the time of his admission the affected knee was about  $1\frac{1}{2}$  inch in circumference larger than the other. The swelling had the form of the articulating ends of the bones. The leg was half bent, and all attempts to give it motion gave great uneasiness. The pain which he experienced was great at all times, but particularly at night, when it very much disturbed his rest.

Soon after his admission, an abscess was discovered on the outside of the knee, which burst in the beginning of February, and discharged a large quantity of matter. On the 18th of March, the limb was removed by amputation.

On examining the joint, the greater part of the cartilaginous surfaces of the tibia, femur, and patella were found destroyed by ulceration. Where the cartilage was destroyed, the exposed bone was carious, and in some places covered by a thin layer of coagulable lymph; but in other respects, the bone was free from disease. There were scarcely any remains of the semilunar cartilages. The joint contained pus, and the abscess in the joint had made its way into the external parts



through an ulcerated opening in the synovial membrane. The synovial membrane was in a natural state, except that, in a few places, there was a thin layer of coagulable lymph on its surface, which, evidently, had been recently effused. The external lateral ligament was destroyed by the abscess : the other ligaments were entire.

In this case, the principal disease observed in the dissection, was the ulcerated state of the cartilages. There was no affection of the synovial membrane beyond what might be considered as arising from the formation of pus in the joint, and the bursting of the abscess externally. Where inflammation of this membrane is the primary disease, swelling takes place often in a few hours, always within two or three days from the beginning of the attack ; whereas in this instance, the constant answer, which the patient gave to the repeated enquiries made of him, was, that he had had violent pain for six weeks before the joint was observed to be enlarged. From all these circumstances, we may conclude, that in this case as well as in the last, the cartilages were the original seat of the disease, and that the morbid appearances observed in the soft parts were the consequence of the formation of the abscess in the joint.

*CASE XIX.*

Jane Bannister, 40 years of age, was admitted into St George's Hospital in September, 1810, on account of a disease in her right foot. She gave the following account of her case.

In the September of the preceding year, she wrenched her instep, and soon afterwards experienced violent pain in this part, so that she was unable to stand on the foot, and her rest was much disturbed at night. The pain continued very severe, and at the end of four months, she observed, for the first time, a slight swelling on the inside of the foot. This was occasioned by an abscess, which was opened by her medical attendant in the April following.

At the time of her admission into the hospital, the whole foot was swollen, and she complained of violent pain in it. The abscess continued open, discharging a small quantity of pus. On introducing a probe into the orifice, an exposed surface of bone was felt. Several applications were made without benefit, and the leg was amputated on the 25th of February, 1811.

On examining the amputated foot, the cartilages of the joint formed by the astragalus and os naviculare were found destroyed by ulceration,

and a portion of the astragalus was dead, and undergoing the process of exfoliation. The cartilages of the joints formed by the cuneiform bones with each other, with the os naviculare, and with the metatarsal bones were in like manner destroyed, and the exposed surfaces of bone were carious. The abscess communicated with the carious joints. The ligaments and synovial membrane were in a natural state, except in a few spots, where they were destroyed by the abscess. The bones possessed their natural texture and hardness. The cellular membrane of the foot contained coagulable lymph and serum.

From the previous history, as well as from the appearances on dissection, there can be as little doubt in this case as in either of the two preceding, that the original disease was the ulceration of the cartilaginous surfaces, and that the other parts were affected only in a secondary manner.

It would be needless to add to the foregoing, an account of other cases, in which the disease was in a still more advanced stage. The progress of it in other joints, corresponds with that in the hip, and whatever may be the joint affected, there is ultimately the same complete destruction of the cartilages, and the same extensive ravages are committed among the bones and soft parts.

In one of the cases related in this section, where

ulceration of the cartilages had begun in several other joints, those between the bodies of some of the dorsal vertebræ were very much altered from their natural structure, and this circumstance rendered it probable, that in the ordinary cases of caries of the spine, the disease has its origin in the intervertebral substance, and that it corresponds to the ulceration of the cartilage in other joints. In cases of this disease, which I have examined after death, the appearances have tended to confirm this conclusion, as I have found the destruction of the intervertebral cartilages to be greater than that of the vertebræ themselves, and the caries of the last has been either entirely confined to, or most extensive on, those surfaces, to which the cartilages had been connected. The following case, which came under the observation of Mr. Howship, and the particulars of which he communicated to me, appears to complete the evidence on this subject.

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### *CASE XX.*

Christiana Clear, a girl eight years of age, was admitted into the Infirmary of St. George's parish, in the year 1808, on account of a disease of the spine. At this time the upper part of the spine was bent forward, and the spinous processes of some of the dorsal vertebræ, formed a preternatu-

ral projection at the posterior part ; but still, she was able to walk without assistance.

Soon after her admission, an abscess formed and burst in the groin ; and this was followed by a second which burst near the former.

The child was now forced to be confined entirely to her bed. The abscesses continued to discharge pus. She became affected with hectic fever ; nevertheless more than two years elapsed, from the time of her having been first admitted into the infirmary, before she died.

On inspecting the body, it was found to be universally anasarcaous. The abdominal muscles were so wasted that scarcely any vestige of them was observable. This, probably, arose from the child having remained in bed for so long a period previous to her death, and having scarcely ever varied her position.

At the posterior part of the abdomen, there was a confused mass of soft substance, which proved to be the parietes of an abscess communicating with the orifices in the groin.

The bodies of the lowest dorsal, and three superior lumbar vertebræ were found at the posterior part of the abscess nearly consumed by the caries.

There were no remains of the intervertebral cartilage between the 10th and 11th dorsal, nor of that between the 3d and 4th lumbar vertebræ. These intervertebral spaces were filled with pus, and the opposite surfaces of the vertebræ were carious, but only in a slight degree. The central part of the intervertebral cartilage, between the bodies of the 9th and 10th dorsal vertebræ, was completely absorbed, and pus was found in its place. Externally to this abscess, the concentric layers of elastic cartilage were entire, though somewhat altered from their natural appearance.

The case just related, and the circumstances before mentioned, seem to warrant the conclusion, that, in the ordinary cases of caries of the spine, the disease is, originally, an ulceration and abscess of one or more of the intervertebral cartilages, beginning in the centre, and extending to the circumference, and afterwards affecting the bodies of the contiguous vertebræ\*.

\* Mr. Pott, in his treatise on the disease of the spine, speaks of it as shewing itself in a variety of forms, "sometimes in that of a thickened state of the ligaments," "sometimes in that of a distempered state of the intervertebral cartilages," "sometimes in that of diseased glands," &c. There can be no doubt that the spine is subject to many morbid affections; but I believe it will be found that the symptoms described by Mr. Pott, attended with a curvature of the spine forwards, and projection of the spinous processes backwards, are produced only by the disease described above, and that it is this disease only, which is relieved by the method of treatment which he has recommended.—

After stating these facts, it is however proper to mention, that I have examined some cases, in which the spine was carious, and in which the bodies of the vertebræ were extensively destroyed, while the intervertebral cartilages were very little, or not at all affected : but in all cases of this kind, which have come under my observation, the caries was evidently not the original affection, but the consequence of some other disease external to the spine. Thus, where an abscess has formed in the psoas muscle, or in the cellular membrane, which surrounds it, the matter resting on the vertebræ occasions caries of the bones, but not of the cartilages between them ; so that in some instances, where the disease has been of long continuance, the former have been found extensively destroyed, while the latter have remained projecting almost of their natural size.

In some cases, the ulceration of the cartilage of a joint begins on that surface, which is connected to the bone, and from having observed this circumstance, I was at first led to adopt an opinion which I heard stated to have been that of Mr. Hunter, and which appeared to be warranted by the small degree of vascularity which cartilage possesses, that ulceration of it takes place, not from the action of its own

The lateral curvature of the spine is a different affection, being, in general, the consequence of a soft or rickety state of the bones.

vessels, but in consequence of it being acted on by the vessels of the bone, to which it is connected. I afterwards found, that in many instances, previously to ulceration, the cartilage undergoes a remarkable change of texture, becoming soft, and assuming a fibrous appearance; thence I was led to conclude that this opinion is not altogether correct, and I now am able to adduce the two following cases, which seem to prove that cartilage, as well as other parts, is capable of ulcerating from the action of its own vessels.

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#### *CASE XXI.*

A boy, 12 years of age, on the 28th of June, 1809, fell from a height, and pitched on one of his knees. When he was brought to the hospital, he was found to have a compound fracture of the femur. For some days he appeared to go on well, but afterwards an abscess formed in the thigh extending as high as the nates; and he sunk and died on the 21st of July. On examining the knee-joint after death, the cartilage covering the condyles of the femur, and that covering the head of the tibia was found, in some parts, entirely absorbed, so that the bone was exposed; and in other parts it was absorbed on the surface towards the cavity of the joint, while the layer of it next to the bone retained its natural adhesion, and its natural structure. The cartilage, in these parts,



was formed into grooves, having an appearance as if the greater portion of its substance had been removed with a chissel.

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### *CASE XXII.*

A middle-aged man met with an injury of the knee, which was followed by inflammation and suppuration, and he died in St. George's Hospital on the 30th of August, 1809.

On examining the joint after death, the cartilage covering the condyles of the femur, and the head of the tibia, was found entirely destroyed towards the circumference, so that the bone was exposed. Elsewhere, only a thin layer of cartilage remained; but this had its ordinary texture, and adhered as firmly as usual to the bone.

As in these cases the cartilage was absorbed on the surface towards the cavity of the joint, while the remainder still adhered to the bone, it is evident that the absorption must have taken place from the vessels of the cartilage itself.

In young persons, before the period of growth is over, the articular cartilages possess more vascularity than in others, so that their vessels are distinctly to be seen, and admit of being injected,

which is not the case in adults; and this explains why the ulceration of the cartilage takes place more frequently, and makes more rapid progress in the former than in the latter.

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When the disease, which has been described in this present section, has made very considerable progress, if the patient recovers so as to preserve the limb, he seldom has the use of the joint afterwards, the bones composing it being united by ankylosis; but if it has been checked in a less advanced stage, even though the whole of the cartilages have been destroyed, the patient may retain the natural motion of the joint. In these cases, I have no reason to believe that there is ever any attempt at the regeneration of the cartilage. In some instances a smooth, compact layer of bone is formed on the carious surface, nearly similar to what is seen in a healthy bone, after the cartilage is destroyed by maceration. I have many times, in dissection, observed a considerable portion of the cartilage of a joint wanting, and in its place a thin layer of hard, compact, semitransparent substance, having an irregular granulated surface. It is probable, that in these cases the original disease had been ulceration of the cartilage. In a subject in the dissecting-room, I found no remains of cartilage on the bones of one hip, but in its place, a crust of bony matter was formed, of a

compact texture, of a white colour, smooth, and having an appearance not very unlike that of marble. I suspected this also to have been a case, in which the patient had recovered after ulceration of the cartilage, and this opinion was rendered more probable by the following case, which afterwards occurred.

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### *CASE XXIII.*

A woman, 36 years of age, was admitted into St. George's Hospital with pain in the hip and knee on one side. The nates were wasted and flattened, and a large abscess had burst, leaving a sinus communicating with the hip-joint. She was affected with hectic fever, and she gradually sunk and died. On inspecting the body, various sinuses were found in the neighbourhood of the hip, and communicating with it.

The synovial membrane and capsular ligament had undergone no alteration in their appearance beyond what evidently depended on the abscess. The cartilage was every where absorbed from the articulating surfaces, and in its place, there was a white polished surface, similar to that which has been just described.

§ 6. *On the Scrophulous Affection of the Joints.*

The term scrophula is often employed without much precision, and indeed it is not always easy to determine what symptoms ought, and what ought not, to be referred to this disease. It has been usual to regard nearly all the affections of joints as scrophulous, and I believe it may be found that persons having a predisposition to scrophula are, on the whole, more liable than others to those affections which form the subject of the preceding sections. As, however, they occur very frequently, where no such pre-disposition exists, there seem to be no sufficient grounds for considering them as having any necessary connection with it; and it can be no more proper to designate these as scrophulous, than it would be to denominate inflammation of the synovial membrane a mercurial disease, because it occasionally arises from the use of mercury. But there is another malady which affects the joints, having all the characters of scrophula; occurring only in persons having a scrophulous appearance, and usually preceded by, or combined with, other scrophulous symptoms.

In the scrophulous disease of the joints, the bones are primarily affected, in consequence of which ulceration takes place in the cartilages covering their articulating extremities. The car-

tilages being ulcerated, the subsequent progress of the disease is the same as where this ulceration takes place in the first instance.

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### *CASE XXIV.*

Charles Miller, twenty years of age, having blue eyes, light hair, and a fair complexion, was admitted into St. George's Hospital, in April, 1808, on account of a disease in one foot. The whole foot was swollen and œdematous, with two fistulous sinuses, one on the inside and the other on the outside, through which a small quantity of scrophulous matter was discharged. A probe being introduced into either of these sinuses, some exposed pieces of bone might be distinguished.

On the 16th of May, the limb was amputated below the knee.

On examining the amputated foot, the muscles were found pale and wasted from want of use, and the cellular membrane was distended with serum and coagulable lymph.

The extremities of the tibia and fibula, all the bones of the tarsus, and the extremities of the bones of the metatarsus, contained much less earthy matter than is usual. They were so soft

that they might be cut with a scalpel, without the edge of it being turned. They were preternaturally red and vascular, and a yellow cheesy substance was deposited in the cancelli. The cartilage at the base of the fifth metatarsal bone was destroyed by ulceration. Those at the bases of the three middle metatarsal bones were also destroyed, and the exposed surfaces of bone were dead, and undergoing the process of exfoliation. The cartilages of all the other bones were in a natural state. Pus and coagulable lymph was effused in the neighbourhood of the dead and carious bones; and the sinuses communicated with them. The synovial membrane and ligaments were in a natural state, except where destroyed by the abscesses.

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### CASE XXV.

John King, 26 years of age, having blue eyes, thick lips, and a florid complexion, was admitted into St. George's Hospital, on the 1st of June, 1811, on account of a complaint in his right ankle and foot. I received the following account of his case, partly from himself, and partly from a medical gentleman, who was in the habit of seeing him before he came into the hospital.

About the end of May, 1810, he wrenched his

foot. The instep and ankle became swollen and painful, but in a few days these symptoms subsided. During the summer he experienced slight pain and weakness of these parts whenever he took more than his usual quantity of exercise ; but in October a slight tumefaction was observed on each side of the ankle, and the pain was more severe, but still not sufficient to prevent his going about his usual occupations. About the middle of December the pain became more violent, and he was confined to the house for a fortnight ; after this the pain abated, so that he was able to go about with the assistance of a crutch.

In March, 1811, an abscess burst on the outside of the foot. The formation of the abscess was not attended with any considerable degree of pain.

He formerly had been supposed to labour under incipient *phthisis pulmonalis* ; but from the time of the disease having been begun in his foot, he suffered no inconvenience from the complaint in his lungs.

At the time of his admission into the hospital, there was a diffused œdematous swelling of the soft parts over the whole foot and ankle. On the outside there were the orifices of three or four sinuses, which had burst at different periods. He had very little pain, even on motion or pressure. Soon

after his admission; another abscess broke on the inside of the heel. On the 11th of July, the leg was amputated.

On examining the foot, the cells of the cellular membrane were found distended with serum and coagulable lymph.

All the bones had undergone a morbid change, similar to what was observed in the last case, except that they were still softer, and more vascular. The cartilages of the ankle were completely destroyed by ulceration, and the exposed surfaces of bone were in a state of caries. The cartilages of the tarsus were entire, but, in some places, of a red colour, and this was found to arise from vessels loaded with red blood, extending into them from the bone. The ligaments and synovial membranes of the tarsal joints were in a natural state, as were also those of the ankle, except where they had been destroyed by the abscesses.

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### *CASE XXVI.*

This patient was a soldier in the Coldstream Guards; I once had an opportunity of seeing him before amputation was performed, and, through the kindness of the medical officers of the regiment, I was favoured with the previous history of



the complaint, and with the opportunity of examining the amputated joint.

William Miles, twenty years of age, of a delicate complexion, with red hair and dilated pupils, was attacked with a slight pain and swelling of the left knee, about the middle of January, 1808. On keeping quiet for a few days the swelling subsided; but it returned about the end of March, though still attended with very little pain. He was received into the hospital of the battalion at Chatham, and, on the 9th of June following, he was sent to the regimental hospital in London.

At this time the diseased knee measured in circumference three inches more than the other. Fluid was felt external to the joint, and in the cavity of the joint itself. The leg was kept extended, and all attempts to bend it gave considerable pain; but otherwise the pain which he endured was trifling, amounting only to a slight degree of uneasiness deep-seated in the joint. On the 8th of July, an abscess burst near the inner edge of the patella, and discharged about eight ounces of thin pus. On the 27th of July the limb was amputated.

On examining the knee, the articulating extremities of the tibia and fibula were found so soft that they were readily cut by a common knife: they contained much less earthy matter than is

usual, and their cancelli were filled by a yellow cheesy substance.

The cartilage covering the head of the tibia was destroyed by ulceration in a few spots at the margin. That of the femur was eroded for a very small extent behind the crucial ligaments. The patella, and the cartilage covering it were in a natural state. Coagulable lymph, having a gelatinous appearance, had been effused into the cellular membrane, on the outside of the synovial membrane. Pus was found external to the joint, and in the joint itself.

The preceding cases sufficiently illustrate the nature and progress of this disease. The morbid affection appears to have its origin in the bones, which become preternaturally vascular, and containing a less than usual quantity of earthy matter, while, at first, a transparent fluid, and afterwards a yellow cheesy substance, is deposited in their cancelli.

From the diseased bone, vessels carrying red blood shoot into the cartilage, which afterwards ulcerates in spots, the ulceration beginning on that surface which is connected to the bone. The ulceration of the cartilage often proceeds very slowly. I have known a knee amputated on account of this disease, in which the cartilage was absorbed for not more than the extent of a sixpence.

Occasionally, but not often, a portion of the carious bone dies, and exfoliates.

As the caries of the bones advances, pus is collected in the joint. At last the abscess bursts externally, having formed numerous and circuitous sinuses.

Inflammation takes place of the cellular membrane, external to the joint. Serum, and afterwards coagulable lymph, is effused, and hence arises a puffy elastic swelling in the early, and an oedematous swelling in the advanced, stage of the disease.

Scrophula attacks only those bones, or portions of bones, which have a spongy texture, as the extremities of the cylindrical bones, and the bones of the carpus and tarsus; and hence the joints become affected from their contiguity to the parts which are the original seat of the disease. I have never met with an instance of the alteration of structure, which has been just described, in the cranium, nor in the middle of the cylindrical bones.

Examples of this disease occur in almost every joint of the body, but oftener in those of the carpus and tarsus than in any other. In one instance which came under my notice, nearly all the joints

of the body were affected at the same time in the same individual.

It should be observed, that in some other cases besides those of scrophulous affection, the bones are found to be more or less altered from their natural texture. When a bone is extensively carious, it appears as if the absorption of the earthy part takes place more rapidly than that of the animal matter, and hence it becomes preternaturally soft in the neighbourhood of the carious surface, at the same time that it assumes a dark colour and has a foetid smell from the lodgment of matter in the cancelli. In cases where a disease has evidently originated in the soft parts of a joint, I have occasionally found the bones to have lost much of their original hardness of texture, though the alteration has been in a much less degree than in scrophulous bones, and without the deposition of yellow cheesy substance in the cancellous structure. Some circumstances induce me to suspect that mere want of use is sufficient to occasion a deficiency in the secretion of phosphate of lime, and, indeed, the analogy of what may often be observed after a fracture, renders this highly probable. When the two broken ends of a bone have become united by callus, the callus, in some instances, does not become ossified, while the patient continues in bed, and in a state of rest; but if he moves about on crutches, and exer-

cises the limb, the ossification is speedily produced.

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The diseases which have been described in the foregoing sections are those of the most frequent occurrence. There are some other affections to which the joints are liable, but a brief notice of these will be sufficient.

1. Occasionally inflammation takes place in the articulating extremity of a bone, and an abscess forms and bursts into the joint. Where this happens, there is sometimes a fresh formation of bony matter in consequence of inflammation, and ossification of the periosteum, and this constitutes the only species of diseased joint which has come under my own observation, in which an actual enlargement of bone takes place. Where the soft parts of a joint are considerably thickened, a feeling is sometimes given to the hand, as if the bones themselves were increased in size; but my friend Mr. Lawrence, some years ago, observed and pointed out that this feeling is deceptive.

2. I have known an instance, in which, without any evident cause, a large portion of the head of the tibia died, and exfoliated, and the destruction of the knee-joint was the consequence.

3. The loose bodies which are occasionally found in a joint, have been so frequently described by writers, that it might appear unnecessary to offer any observations on the subject. But I have met with two cases in which the loose bodies were of a different nature, and had a different origin from those which are ordinarily met with. It not unfrequently happens, that from some morbid action, a bony ridge is formed, like a small exostosis, round the margin of the cartilaginous surfaces of the joint. In the two instances, to which I allude, this preternatural growth of bone had taken place, and in consequence of the motion of the parts on each other, portions of it had been broken off, and lay loose in the cavity of the joint.

4. The effects of gout on the joints are very remarkable. The cartilages are absorbed: the exposed surfaces of bone, are entirely, or partially, encrusted with white, earthy matter, which I conclude to be urate of soda, and sometimes they have the appearance of being formed into grooves, as if they had been worn from their friction on each other. In some cases, repeated and violent attacks of gout occasion complete ankylosis.

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I am induced to hope that the foregoing observations will be found to lay the foundation of a

better arrangement of the diseases of joints, than that which has usually been adopted. I am however well aware that the subject is by no means exhausted. I shall endeavour to avail myself of every opportunity which may occur of prosecuting the investigation further, and, in the mean time, I beg the indulgence of the Society for not having already rendered it more perfect. The study of pathology is indeed attended with peculiar difficulties. There is no science in which a greater number and variety of facts demand our notice; none in which a just and accurate knowledge of facts is less easy to be obtained; or in which the phenomena are so little capable of being reduced to general laws. A multitude of causes, too minute to be detected, silently operate, sometimes to modify and alter the effects of the said morbid action; at other times to give a similar form and character to different diseases. Particular periods and particular climates produce their own peculiar maladies; and hence, the labours of those who have gone before us, or who have made their observations in other countries, are often of little service towards promoting the researches in which we ourselves may be engaged. All these circumstances render it impossible to bring pathology to that degree of perfection, which has been attained in some other branches of knowledge; but the difficulty of the science does not render it less important to human nature, nor less necessary to be pursued by those engaged in the medical profession.